AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Claim 1. (Currently Amended) An image data converting apparatus for converting first compressed image data to second compressed image data being more compressed than the first compressed image data, said first compressed image data being interlaced-scan data compressed by orthogonal transform and motion compensation, and said second compressed data being serial-scan data, said apparatus comprising:

image data decoding means for decoding the first compressed image data by using only lower mth-order orthogonal transform coefficients included in nth-order orthogonal transform coefficients (where m < n), in both a vertical direction and a horizontal direction in the first compressed image data;

scan-converting means for converting interlaced-scan data output from the image data decoding means to serial-scan data; ~~and~~

image data encoding means for encoding the serial-scan data, thereby generating the second compressed image data~~.~~; and

wherein the image data decoding means comprises compression inverse discrete-cosine transform means of a frame-discrete cosine transform mode, wherein the compression inverse discrete-cosine transform means of frame-discrete cosine transform mode performs the inverse discrete cosine transform by using a part of coefficients included in (4X8)th-order discrete cosine transform coefficients input to achieve the field-discrete compression

inverse discrete cosine transform, while replacing remaining coefficients by 0s, thus discarding the remaining coefficients.

Claim 2. (Previously Presented) The apparatus according to claim 1, wherein the first compressed image data is MPEG2-image compressed data containing eighth-order discrete cosine transform coefficients in both the vertical direction and the horizontal direction, the image data decoding means is MPEG2-image data decoding means for decoding the MPEG2-image compressed data in both the vertical direction and the horizontal direction, by using only lower fourth-order coefficients included in the eighth-order discrete cosine transform coefficients, and the image data encoding means is MPEG4-image encoding means for encoding the serial-scan data from the scan converting means, thereby generating MPEG4-image compressed data.

Claim 3. (Previously Presented) The apparatus according to claim 2, further comprising picture-type determining means for determining a code type of each frame in the interlaced-scan MPEG2-image compressed data, for outputting data about an intra-image encoded image/forward prediction encoded image, and for discarding data about a bi-directional prediction encoded image, thereby to convert a frame rate, wherein an output of the picture-type determining means is input to the MPEG2-image data decoding means.

Claim 4 (Original) The apparatus according to claim 3, wherein the MPEG2-image data decoding means decodes only the intra-image encoded image/forward prediction encoded image.

Claim 5. (Currently Amended) The apparatus according to claim 2, wherein the MPEG2-image data decoding means comprises variable-length decoding means, and the variable-length decoding means performs variable-length ~~encoding~~ decoding on only discrete cosine transform coefficients required in a discrete cosine transform, in accordance with whether a macro block of the input MPEG2-image compressed data is of a field-discrete cosine transform mode or a ~~fame-discrete~~ frame-discrete cosine transform mode.

Claim 6. (Previously Presented) The apparatus according to claim 2, wherein the MPEG2-image data decoding means comprises compression inverse discrete-cosine transform means of a field-discrete cosine transform mode, the compression inverse discrete-cosine transform means extracts only the lower fourth-order coefficients included in the eighth-order discrete cosine transform coefficients, in both the vertical direction and the horizontal direction, and then performs a fourth-order inverse discrete cosine transform on the lower fourth-order coefficients extracted.

Claim 7. (Previously Presented) The apparatus according to claim 6, wherein the inverse discrete-cosine transform is carried

out in both the horizontal direction and the vertical direction by a method based on a predetermined fast algorithm.

Claim 8. (Canceled)

Claim 9. (Currently Amended) The apparatus according to claim ~~8~~ 1, wherein the inverse discrete-cosine transform is carried out in both the horizontal direction and the vertical direction by a method based on a predetermined fast algorithm.

Claim 10. (Currently Amended) The apparatus according to claim ~~8~~ 1, wherein ~~the compression inverse discrete-cosine transform means of frame-discrete cosine transform mode performs the inverse discrete cosine transform by using~~ the part of the coefficients included in the (4X8)th-order discrete cosine transform coefficients is only ~~(4 × 4 + 4 × 2)~~ (4X4) and (4X2) th-order coefficients included in (4 × 8)th-order discrete cosine transform coefficients ~~input to achieve the field-discrete compression inverse discrete cosine transform, while replacing remaining coefficients by 0s, thus discarding the remaining coefficients~~.

Claim 11. (Previously Presented) The apparatus according to claim 2, wherein the MPEG2-image data decoding means comprises motion-compensating means, wherein the motion-compensating means performs 1/4-precision pixel interpolation in both the horizontal direction and the vertical direction in accordance with a motion

vector contained in the input MPEG2-image compressed data.

Claim 12. (Previously Presented) The apparatus according to claim 11, wherein the motion-compensating means initially performs 1/2-precision pixel interpolation in the horizontal direction by using a twofold interpolation digital filter and then performs the 1/4-precision pixel interpolation by means of linear interpolation.

Claim 13. (Previously Presented) The apparatus according to claim 11, wherein the motion-compensating means initially performs 1/2-precision pixel interpolation in a field, as vertical interpolation by using a twofold interpolation digital filter, and then performs the 1/4-precision pixel interpolation in the field by means of linear interpolation, when a macro block of the input MPEG2-image compressed data is of a field prediction mode.

Claim 14. (Previously Presented) The apparatus according to claim 11, wherein the motion-compensating means initially performs 1/2-precision pixel interpolation in a field, as vertical interpolation by using a twofold interpolation digital filter, and then performs the 1/4-precision pixel interpolation in the field by means of linear interpolation, when a macro block of the input MPEG2-image compressed data is of a frame prediction mode.

Claim 15. (Previously Presented) The apparatus according to claim 11, wherein the motion-compensating means includes a half-band digital filter for performing the pixel interpolation in both the horizontal direction and the vertical direction.

Claim 16. (Previously Presented) The apparatus according to claim 11, wherein the MPEG2-image data decoding means further comprises storage means for storing pixel values, and the motion-compensating means calculates coefficients equivalent to a sequence interpolating operation and applies the coefficients, thereby to perform motion compensation on the pixel values read from the storage means in accordance with the motion vector contained in the input MPEG2-image compressed data.

Claim 17. (Previously Presented) The apparatus according to claim 11, wherein, when pixel values outside an image frame are required to achieve twofold interpolation, the motion-compensating means performs one of a mirror process and a hold process, thereby generating a number of virtual pixel values equal to a number of taps provided in a filter in order to accomplish motion compensation, before performing the motion compensation.

Claim 18. (Previously Presented) The apparatus according to claim 17, wherein the motion-compensating means performs one of the mirror process and the hold process in units of fields.

Claim 19. (Previously Presented) The apparatus according to claim 2, wherein the scan-converting means preserves one of a first field and a second field of the interlaced-scan image data output from the MPEG2-image data decoding means, discards the one of the first and second fields not preserved, and performs twofold up-sampling on preserved pixel values, thereby converting the interlaced-scan data to serial-scan data.

Claim 20. (Currently Amended) The apparatus according to claim 2, wherein the MPEG2-image data decoding means has the function of ~~encoding~~ decoding only a region composed of one or more macro blocks that surround an object in an intra-image encoded image/forward prediction encoded image.

Claim 21. (Previously Presented) The apparatus according to claim 2, further comprising motion-vector synthesizing means for generating a motion vector value corresponding to the image data subjected to scan conversion, from a motion vector data contained in the input MPEG2-image compressed data.

Claim 23. (Currently Amended) An image data converting method of converting first compressed image data to second compressed image data being more compressed than the first compressed image data, said first compressed image data being interlaced-scan data compressed by orthogonal transform and motion compensation, and said second compressed data being serial-scan data, said method comprising the steps of:

decoding the first compressed image data by using only lower mth-order orthogonal transform coefficients included in nth-order orthogonal transform coefficients (where m < n), in both a vertical direction and a horizontal direction in the first compressed image data;

converting interlaced-scan data output from the step of decoding to serial-scan data; ~~and~~

encoding the serial-scan data, thereby generating the second compressed image data~~.~~; and

wherein the step of decoding comprises performing compression inverse discrete-cosine transform of a frame-discrete cosine transform mode, wherein the compression inverse discrete-cosine transform of frame-discrete cosine transform mode performs the inverse discrete cosine transform by using a part of coefficients included in (4X8)th-order discrete cosine transform coefficients input to achieve the field-discrete compression inverse discrete cosine transform, while replacing remaining coefficients by 0s, thus discarding the remaining coefficients.

Claim 24. (Previously Presented) The method according to claim 23, wherein the first compressed image data is MPEG2-image compressed data containing eighth-order discrete cosine transform coefficients in both the vertical direction and the horizontal direction, the step of decoding the first compressed image data decodes the MPEG2-image compressed data in both the vertical direction and the horizontal direction, by using only lower fourth-order coefficients included in the eighth-order discrete

cosine transform coefficients, and the step of encoding the serial-scan data encodes the serial-scan data, thereby generating MPEG4-image compressed data.

Claim 25. (Previously Presented) The method according to claim 24, wherein the code type of each frame in the interlaced-scan MPEG2-image compressed data is determined, data about an intra-image encoded image/forward prediction encoded image is output in accordance with the code type determined, data about a bi-directional prediction encoded image is discarded thereby to convert a frame rate, and the MPEG4-image compressed data is generated from the converted frame rate.

Claim 26. (Original) The method according to claim 25, wherein only the intra-image encoded image/forward prediction encoded image is decoded in the step of decoding the MPEG2-image compressed data.

Claim 27. (Previously Presented) The method according to claim 24, wherein in the step of decoding the MPEG2-image compressed data, variable-length decoding is performed on only the discrete cosine transform coefficients required in a discrete cosine transform, in accordance with whether a macro block of the input MPEG2-image compressed data is one of a field-discrete cosine transform mode and a frame-discrete cosine transform mode.

Claim 28. (Previously Presented) The method according to

clam 24, wherein in the step of decoding the MPEG2-image compressed data, an inverse discrete-cosine transform of a field-discrete cosine transform mode is performed by extracting only the lower fourth-order coefficients included in eighth-order discrete cosine transform coefficients, in both the vertical direction and the horizontal direction, and then by performing fourth-order inverse discrete cosine transform on the extracted lower fourth-order coefficients.

Claim 29. (Original) The method according to claim 28, wherein the inverse cosine transform is carried out in both the horizontal direction and the vertical direction, by a method based on a predetermined fast algorithm.

Claim 30. (Previously Presented) The method according to claim 24, wherein in the step of decoding the MPEG2-image compressed data, a compression inverse discrete-cosine transform of a frame-discrete cosine transform mode is performed by extracting only the lower fourth-order coefficients included in eighth-order discrete cosine transform coefficients and then fourth-order inverse discrete cosine transform is performed on the extracted lower fourth-order coefficients, in the horizontal direction, and field-discrete cosine transform is performed in the vertical direction.

Claim 31. (Original) The method according to claim 30, wherein the inverse cosine transform is carried out in both the

horizontal direction and the vertical direction, by a method based on a predetermined fast algorithm.

Claim 32. (Currently Amended) The method according to claim 30, wherein in the compression inverse discrete-cosine transform of frame-discrete cosine transform mode, only ~~(4 4 + 4 2)~~ (4X4) and (4X2) th-order coefficients included in (4 X 8)th-order discrete cosine transform coefficients input are used to achieve inverse cosine transform, while replacing the remaining coefficients by 0s.

Claim 33. (Previously Presented) The method according to claim 24, wherein in motion compensation performed in the step of decoding the MPEG2-image compressed data, 1/4-precision pixel interpolation is carried out in both the horizontal direction and the vertical direction, in accordance with a motion vector contained in the input MPEG2-image compressed data.

Claim 34. (Previously Presented) The method according to claim 33, wherein in the step of performing motion compensation, 1/2-precision pixel interpolation is initially performed in the horizontal direction by using a twofold interpolation digital filter and then 1/4-precision pixel interpolation is performed by means of linear interpolation.

Claim 35. (Previously Presented) The method according to claim 33, wherein in the step of performing motion compensation,

1/2-precision pixel interpolation is initially performed in a field, as vertical interpolation, by using a twofold interpolation digital filter, and then 1/4-precision pixel interpolation is performed in the field by means of linear interpolation, when a macro block of the input MPEG2-image compressed data is of a field prediction mode.

Claim 36. (Previously Presented) The method according to claim 33, wherein in the step of performing motion compensation, 1/2-precision pixel interpolation is initially performed in a field, as vertical interpolation, by using a twofold interpolation digital filter, and then the 1/4-precision pixel interpolation is performed in the field by means of linear interpolation, when a macro block of the input MPEG2-image compressed data is of a frame prediction mode.

Claim 37. (Previously Presented) The method according to claim 36, wherein in the step of performing motion compensation, a half-band filter is used as the twofold interpolation digital filter, to perform the interpolation.

Claim 38. (Previously Presented) The method according to claim 33, wherein in the step of decoding the MPEG2-image compressed data, pixel values are stored, and in the step of performing motion compensation, coefficients already calculated and equivalent to a sequence interpolating operations are applied, thereby to perform motion compensation on the stored pixel values, in accordance with the motion vector contained in the input MPEG2-image compressed data.

Claim 39. (Previously Presented) The method according to claim 33, wherein, when pixel values outside an image frame are required to achieve twofold interpolation, one of mirror process and a hold process is performed, thereby generating a number of virtual pixel values equal to a number of taps provided in a filter required in order to accomplish the motion compensation.

Claim 40. (Previously Presented) The method according to claim 39, in the step of performing the motion compensation, the mirror process or the hold process is carried out in units of fields.

Claim 41. (Previously Presented) The method according to claim 24, wherein in the step of converting, a first field or a second field of the interlaced-scan image data is preserved, and the one of the first and second fields that is not preserved is discarded, and twofold up-sampling is performed on preserved pixel values, thereby converting the interlaced-scan data to

serial-scan data, said first and second fields being contained in the MPEG2-image compressed data that has been decoded.

Claim 42. (Currently Amended) The method according to claim 24, wherein only a region composed of one or more macro blocks that surround an object in an intra-image encoded image/forward prediction ~~encoded~~ decoded image is encoded in the step of decoding the MPEG2-image compressed data.

Claim 43. (Previously Presented) The method according to claim 24, wherein a motion vector value corresponding to the image data subjected to scan conversion is synthesized from motion vector data contained in the input MPEG2-image compressed data.

Claim 44. (Original) The method according to claim 43, wherein a high-precision motion vector is detected from the motion vector value that has been synthesized.